View metadata, citation and similar papers at core.ac.uk
brought to you by CORE
provided by Xiamen University Institutional Repository

学校编码：10384　　分类号_____密级_____
学　　号：X200429007　　UDC_____

厦门大学

硕　士　学　位　论　文

BT620S 立体声蓝牙耳机的设计

Design of BT620S Stereo Bluetooth Headset

张 玉强

指导教师姓名：陈　文　芗　教授
专　业　名　称：仪　器　仪　表

论文提交日期：2009 年　4　月
论文答辩时间：2009 年　5　月
学位授予日期：2009 年　6　月

答辩委员会主席：_____
评　　阅　　人：_____

2009 年 4 月

厦门大学博硕士论文摘要库

厦门大学学位论文原创性声明

本人呈交的学位论文是本人在导师指导下,独立完成的研究成果。本人在论文写作中参考其他个人或集体已经发表的研究成果，均在文中以适当方式明确标明，并符合法律规范和《厦门大学研究生学术活动规范（试行）》。

另外，该学位论文为（　　）课题（组）的研究成果，获得（　　）课题（组）经费或实验室的资助，在（　　）实验室完成。（请在以上括号内填写课题或课题组负责人或实验室名称，未有此项声明内容的，可以不作特别声明。）

声明人（签名）：

年　　月　　日

厦门大学博硕士论文摘要库

厦门大学学位论文著作权使用声明

本人同意厦门大学根据《中华人民共和国学位条例暂行实施办法》等规定保留和使用此学位论文，并向主管部门或其指定机构送交学位论文（包括纸质版和电子版），允许学位论文进入厦门大学图书馆及其数据库被查阅、借阅。本人同意厦门大学将学位论文加入全国博士、硕士学位论文共建单位数据库进行检索，将学位论文的标题和摘要汇编出版，采用影印、缩印或者其它方式合理复制学位论文。

本学位论文属于：

（　　）1.经厦门大学保密委员会审查核定的保密学位论文，于　　年　　月　　日解密，解密后适用上述授权。

（　　）2.不保密，适用上述授权。

（请在以上相应括号内打“√”或填上相应内容。保密学位论文应是已经厦门大学保密委员会审定过的学位论文，未经厦门大学保密委员会审定的学位论文均为公开学位论文。此声明栏不填写的，默认为公开学位论文，均适用上述授权。）

声明人（签名）：

年　　月　　日

厦门大学博硕士论文摘要库

摘 要

蓝牙技术是一种无线数据与语音通信的开放性全球规范，它以低成本的近距离无线连接为基础，为固定与移动设备通信环境建立一个无缝连接。现今，蓝牙技术在实际中已经有广泛的应用。由于手机的普及率较高，因此蓝牙手机成为目前蓝牙技术的主要应用，而与之相匹配的蓝牙耳机则以其便携性和安全性等特点也正在逐渐受到消费者的青睐。因此，设计出一种具有功能强、性能高、成本低的蓝牙耳机已成为蓝牙技术领域的一个重要课题。

本文设计了一种型号为 BT620S 的立体声蓝牙耳机。从硬件、射频、软件和声学几个方面详细介绍了整个设计过程。

在电路中，BT620S 采用了 CSR 的 BC3-MME 蓝牙解决方案。该方案能够在使用最少的外围元件下实现蓝牙协议 2.0 和 A2DP 立体声音频等功能要求。并且，较低的工作和待机功耗使得 BT620S 能够达到 16 小时的连续通话和 260 小时的待机。经过硬件测试验证了 BT620S 符合性能规格要求，并能够达到 ESD 标准。

在射频设计中，BT620S 采用自主设计的反 F 型天线。根据天线仿真和调谐，将蓝牙天线印制到线路板上。这种类型天线不仅可以实现蓝牙射频规范要求，而且具有更好的可靠性和一致性，不需要添加额外的成本。通过传导和辐射测试，验证了 BT620S 的射频性能符合射频规范要求。

应用 CSR 提供的协议栈、库函数和 Bluelab 等软件开发平台，可以简化软件开发流程，节省软件设计资源。用户可以直接通过 BlueVox 和 PSTool 进行功能设定、软件升级和调试。针对立体声蓝牙耳机设计的功能测试以及 IOP 测试可以查出 95%以上的软件设计缺陷。

在声学设计中，BT620S 使用动圈式 Hi-Fi 扬声器和全向型麦克风，接收频率响应范围可达 100Hz-4KHz。声腔的设计是将声腔的几何参数和声学参数转换成电参数，作出等效电路，再通过 Pspise 进行防真，得出接收和发送的频率响应和灵敏度。BT620S 采用 B&K2012 音频测试系统进行声学测试。经过验证，BT620S 在接收和发送路径上的音频性能符合声学规格要求。

目前，BT620S 立体声蓝牙耳机已经进入批量生产，市场反馈良好。该产品为蓝牙音频设备提供了一个典型的设计范例，并且 BT620S 的测试方法和过程对通讯电子类产品具有很高的参考价值。

关键词：蓝牙耳机；BC03-MME；反 F 型天线

厦门大学博硕士论文摘要库

Abstract

Bluetooth technology is a kind of open global criterion for wireless data and audio communication, which bases on low cost and near end wireless connection, and establishes a seamless connection between immobility and mobile communication products. Nowadays, Bluetooth technology has been widely using in practical. Due to cell phone has a very high popularization, so the Bluetooth mobile phone is now becoming the main application for Bluetooth technology. Being as a accessory for mobile phone, the Bluetooth headset is getting more and more consumers' favorite, which depends on it's handy and safe characteristics. Therefore, How to design a kind of Bluetooth headset with powerful function, excellent performance and low cost is becoming a significant subject in the field of Bluetooth technology.

This text is aiming to design a stereo Bluetooth headset which type is BT620S. The whole design process is being presented in detail from hardware, radio, software and acoustics.

From electrical circuit, BT620S introduce BC3-MME Bluetooth solution. This solution is able to comply with Bluetooth 2.0 profile and A2DP stereo audio and some other functional requirements by using minimum peripheral components. And the low operating and standby power consumption allows BT620S is able to achieve up to 16 hours of talk time and 260 hours of standby time. BT620S is complied performance requirements after hardware verification tests, and it can meet ESD criterion.

From RF design, BT620S is using a kind of inverted-F antenna by our independent design. It is a Bluetooth antenna being plated on PCB, according to antenna simulation and tuning. This kind of antenna doesn't only meet the requirement for Bluetooth radio specification, but also be provided with better reliability and uniformity without additional cost. By conducted and radiated verification, the RF performance for BT620S is able to comply with radio frequency specification requirement.

Being applied the software development platform of protocol stack、function database and Bluelab that CSR provided, the software development process can be simplified and development resource can be saved as well. Users are able to directly implement functional setting、Software update and debugging. The functional tests and IOP test were designed for stereo Bluetooth headset particularly, it can find out up to 95% of software design errors.

厦门大学博硕士论文摘要库

From acoustic design, BT620S is using dynamical loop Hi-Fi speakers and an omnidirectional microphone, which the range of receive frequency response is up to 100Hz-4KHz. The sound cavity design is to transform the geometric parameters and acoustic parameters of the sound cavity to electric parameters, and make the equi-circuit, simulate the circuit by Pspise afterwards, that we can get the RX and TX frequency response and sensitivity. We are adopting B&K 2012 audio analyzer system to perform acoustic test for BT620S. After verification test, the performance for BT620S on both receive path and transmit path are able to comply with the requirement for acoustic specification.

Nowadays, BT620S stereo Bluetooth headset has already been coming into mass production, and the feedback from market is favorable. This product provides a typical design example for Bluetooth audio device, and the testing methods and processes provide a very high reference value for electrical communication products.

Key words: Bluetooth headset; BC03-MME; Inverted F antenna

厦门大学博硕士论文摘要库

目 录

厦门大学博硕士论文摘要库

厦门大学博硕士论文摘要库

厦门大学博硕士论文摘要库

厦门大学博硕士论文摘要库

厦门大学博硕士论文摘要库

Table of Contents

厦门大学博硕士论文摘要库

厦门大学博硕士论文摘要库

厦门大学博硕士论文摘要库

厦门大学博硕士论文摘要库

厦门大学博硕士论文摘要库

Degree papers are in the “Xiamen University Electronic Theses and Dissertations Database”. Full texts are available in the following ways:
1. If your library is a CALIS member libraries, please log on http://etd.calis.edu.cn/ and submit requests online, or consult the interlibrary loan department in your library.
2. For users of non-CALIS member libraries, please mail to etd@xmu.edu.cn for delivery details.

厦门大学博硕士论文摘要库